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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/408,279	09/29/1999	JOHN J. ROSATO	SCP-6620	3862

7590

04/08/2003

Stallman & Pollock LLP  
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EXAMINER

KORNAKOV, MICHAIL

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 04/08/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/408,279

Applicant(s)

ROSATO ET AL.

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 December 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 80 and 82-121 is/are pending in the application.
- 4a) Of the above claim(s) 113 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 80, 82-112 and 114-121 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) 80 and 82-121 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☒ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Election/Restrictions***

1. This application contains claims directed to the following patentably distinct species of the claimed invention: claim 112 directed to N-methylpyrrolidinone, as an additive to residue removal chemistry of claim 80; claim 113 directed to hydroxylamine, as an additive to residue removal chemistry of claim 80.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, 80 is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record

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showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Ms. Frost, esq., on April 3, 2003 a provisional election was made with traverse to prosecute the invention wherein N-methylpyrrolidinone is used as an additive to residue removal chemistry, which is recited by claim 112. Affirmation of this election must be made by applicant in replying to this Office action. Claim 113 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Claim 81 is cancelled; claims 80, 83, 88-90 and 98 are amended; new claims 112-121 are introduced in Paper No. 15.

4. A statutory and non-statutory double patenting rejections over copending Application 09/650,382 are withdrawn in light of abandonment of Application No. 09/650,382. Notice of Abandonment has been sent to Applicants on February 25, 2003.

5. Amendment to claim 80 in Paper No. 15 has overcome rejection under 35 USC 112, first paragraph, and rejection is, therefore, withdrawn.

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6. Amendments to claims 88 and 89 previously rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting processing steps have overcome the rejections and rejections are, therefore, withdrawn.

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claim 112 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claim 112, Applicants recite the use of N-methylpyrrolidinone in addition to an organic acid selected from mono and polycarboxylic acids. Thus, according to claim 112, the process should employ the rinsing step with the composition ***comprising mono- or polycarboxylic acid and N-methylpyrrolidinone***. There is absolutely no support in the instant specification for such embodiment. The only places where N-methylpyrrolidinone is mentioned is page 1, line 31 in a section "Background and prior art", as an acknowledgement of N-methylpyrrolidinone as an alkali stripping agent, and on page 16 of the instant specification Applicants mention N-methylpyrrolidinone as a stripper chemistry ingredient. However, nowhere in the instant specification is found an adequate support for the rinsing method using the composition comprising at the same time N-methylpyrrolidinone and mono- or polycarboxylic acid. This is a new matter situation.

9. Claims 80, 82-107 stand rejected and new claims 116-121 under 35 U.S.C. 102(e) as being anticipated by Hineman et al. (U.S. 6,313,048).

Hineman discloses a method of cleaning surfaces of metallized semiconductors by contacting the said surfaces with a composition, which includes acetic acid. Hineman specifically indicates that acetic acid passivates a metal containing surface being cleaned, thus preventing undesirable removal (compare to corrosion, as instantly claimed) of substantial amounts of the metal (see abstract, col. 4, lines 48-51). The method of Hineman can be applied for cleaning operations, performed in fabricating a multilevel interconnect structures, which include the layers of aluminum, aluminum, alloyed with copper, titanium nitride, etc. (col.6, lines 30-39). The exposure time of semiconductor structure to the cleaning composition is adjusted to allow for adequate cleaning without removing excess metal from underlying surfaces (col. 7, lines 25-30). The cleaning composition of Hineman can be applied to metallized surface for one or more of the cleans (col.9, lines 34-35). With regard to the new limitation to claims 80, 88, 89, 90 and 98 i.e. "the substrate having etch residue removal chemistry thereon", Hineman teaches his wet method is used "to remove the photoresist layer and/or other etch related polymers..." (col. 7, lines 3, 4). In a paragraph bridging col. 2 and 3 Hineman teaches that the patterning includes the patterning of Aluminum layer with chlorine containing etchant and a photoresist, which results in organic residue on at least a part of a conductive layer. The cleaning then removes the organic residue, i.e. a metallized organic residue. This expressly reads on the new limitation of claims 80, 88,

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89, 90 and 98. The cleaning method of Heineman is performed by immersing the substrate to be cleaned into a vessel with cleaning composition, this meets the limitations of claims 116-18. The limitations of claims 119-121 are inherently met by Heineman, since Heineman employs the same process steps as instantly claimed and utilizes the same cleaning chemistry, as instantly claimed.

It is axiomatic that one who performs the steps of a process must necessarily produce all of its advantages. Mere recitation of a newly discovered property or **function** that is inherently possessed by the things or steps in the prior art does not cause a claim drawn to those things to distinguish over the prior art, as per **Leinoff v. Louis Milona & Sons, Inc.** 220 USPQ 845 (CAFC 1984).

Therefore, all the limitations of instant claims 80, 82 -107, 116-121 are met by Hineman.

10. Claims 80, 82-87, 90-94, 97-102 , 105-107, 114 and 115 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Eisenmann (IBM Technical Disclosure Bulletin, v.18, No.8, page 2590).

Eisenmann discloses cleansing of aluminum metallization in pads and vias of semiconductor chips at the same time preventing corrosion of aluminum metallization utilizing the step of immersing chips into a solution with predetermined concentration of ***acetic acid and distilled water*** as the only two components of the composition, for the predetermined time, followed by rinsing with distilled water and isopropyl alcohol rinse to aid **drying**.

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With regard to the limitation that the substrate has an etch residue removal chemistry thereon, Eisenman teaches that his composition cleans the aluminum metallization structures in pads and vias, the vias are inherently formed as a result of etching.

Eisenman does not expressly state that the substrate has an etch residue removal chemistry thereon.

However, since Eisenman provides his composition and cleaning process for cleansing of aluminum metallization in pads and vias (lines 1 and 2), a person skilled in the art would have found it obvious that in case of wet etching that is routinely used for formation of vias, a residue after etching solution will be present on the surface of said substrate.

11. Claims 108-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eisenmann (IBM Technical Disclosure Bulletin, v.18, No.8, page 2590) in view of EP 0784336.

Eisenmann discloses cleansing of aluminum metallization without corrosion utilizing immersing of metallized substrates into a solution with predetermined concentration of acetic acid and distilled water for the predetermined time, followed by rinsing with distilled water and isopropyl alcohol and further drying. Eisenmann does not specifically disclose the drying technique. However, Eisenmann indicates the use of isopropyl alcohol (isopropanol) to aid drying.



EP'336 teaches a method of cleaning a semiconductor substrate, which includes steps of rinsing the semiconductor substrate with solution comprised acetic acid and vapor drying the semiconductor substrate with the vapor comprised isopropanol (see abstract). The steps of rinsing and drying may be performed in the same processing tank (page 3, lines 58-59).

Because Eisenmann and EP'336 both teach cleaning/rinsing of semiconductor substrates with acetic acid, followed by drying, and Eisenmann provides for the use of isopropanol to aid drying procedure, and since EP'336 utilizes isopropanol vapor for the drying of semiconductor substrate, and since it is a conventional knowledge that isopropanol vapor removes water droplets from semiconductor surfaces, one skilled in the art would have found it obvious to dry metallized substrates of Eisenman with isopropanol vapor of EP'336 in order to simplify the drying process and eliminate any water droplets from the metallized substrates of Eisenmann.

12. Claim 112 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heineman et al in view of Schwartzkopf (U.S. 5,308,745).

Heinemann teaches the process, as instantly claimed utilizing the rinsing solution identical to that as instantly claimed . He does not teach the addition of N-methylpyrrolidinone to a rinsing composition.

However, Heinemann motivates a person skilled in the art to vary the composition of rinsing solution by stating that in order to remove the photoresist layer and/or etch related polymers, any suitable method can be used.

Schwartzkopf discloses combinations of non-nitrogen containing weak acids, such as acetic acid and amine containing alkali strippers and a solvent, such as N-methylpyrrolidinone for compositions capable of removing hardly crosslinked photoresist without producing any substantial corrosion (abstract, col.3, lines 5-10, 60-65, especially Example 9 in col. 8).

Since both Heinemann and Schwartzkopf are concerned with preventing of corrosion of metallized structure, and both utilize a cleaning chemistry, containing an acetic acid to remove etch residues, a person skilled in the art, motivated by suggestion of Heinemann, would have found it obvious at the time the invention was made to add a solvent of Schwartzkopf, namely N-methylpyrrolidinone in a rinsing composition of Heinemann in order to enhance the rinsing action of acetic acid formulation and ensure full removal of the photoresist residue.

### ***Response to Arguments***

13. Applicant's arguments filed 12/13/2002 have been fully considered but they are not persuasive. Applicants presented absolutely no arguments as to the substance of rejection, nor did they point out how their claims are different from the teaching of the prior art. Therefore, Applicants' statement on page 6 of Paper No. 15, that cited references do not anticipate or otherwise render unpatentable the present claims is just a conclusory statement, and are not entitled to probative weight, as per *In re Pearson*, 181 USPQ 641 (CCPA 1974), *In re Wood*, 199 USPQ 137 (CCPA 1978), *In re Payne*, 203 USPQ 245 (CCPA 1979).

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14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (703) 305-0400. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872 9310 for regular communications and (703) 872 9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 2450.

Michael Kornakov  
Examiner  
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MK  
April 4, 2003

A handwritten signature in black ink, appearing to read "Randy Gulakowski". The signature is fluid and cursive, with the first name "Randy" being more prominent.

RANDY GULAKOWSKI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700